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RELATIONSHIP BETWEEN OBESITY AND PERIODONTITIS: AN EPIDEMIOLOGICAL STUDY

Periodontology

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ABSTRACT

AIM: The aim of the study was to evaluate the relationship between obesity and periodontitis.
MATERIALS AND METHODS: A total of 200 subjects aged between 20- 60 years were recruited from Department of Periodontics, shree bankey bihari dental College and Hospital, ghaziabad. Periodontal status of the subjects was recorded. Body mass index were used as measure to assess obesity. Other variables like age, gender, were also recorded.
RESULTS: When evaluation was done for prevalence of periodontal disease according to BMI in obese and non-obese, The result obtained showed that out of 200 patient in the distribution of pocket depth and clinical attachment loss who are non obese were 106 out of which only 30 patient (28.3%)were affected by periodontal disease as compared to 94 obese patient out of which 70 patient(74.4%) were affected by periodontal disease.
CONCLUSION: The prevalence of periodontal disease is higher among obese subjects. Obesity could be a potential risk factor for periodontal disease in all age groups.

KEYWORDS

BMI; Obesity; Periodontitis; Periodontal Parameters.

INTRODUCTION :
Obesity, one of the most significant health risks of modern society, is now recognized as a chronic disease with multifactorial etiology. Obesity may be considered as alow grade systemic inflammatory disease. Obese children and adults have elevated serum level of C-reactive proteins, interleukin-6, tumor necrosis factor-alpha and leptin which is known as marker of inflammation and are closely associated with chronic inflammatory diseases. Therefore, these findings indicate rationalized bases for association between obesity and periodontal disease, which is also an inflammatory disease resulting from complex interaction between pathogenic microbes and host immune response.[1]

Beside being a risk factor for periodontal disease, certain cancer and type II diabetes, obesity has been suggested to be a risk factor for periodontitis.[1]

Obesity is an excess amount of body fat in proportion to lean body mass, to the extent that health is impaired. The most commonly used measure of body fat is the body mass index, which is defined as a person's weight, in kilograms, divided by the square of his/her height in meters. The World Health Organization and the National Heart, Lung and Blood Institute (NHLBI) define overweight as a body mass index of 25–29.9 and obesity as a body mass index of ≥30.[2]

Obesity, defined as a body mass index (BMI) >30.0 kg/m2, is a major public health problem today. The prevalence of obesity has increased substantially over the past decades in most industrialized countries. Obesity is a risk factor for several chronic diseases, most notably hypertension, type 2 diabetes, dyslipidemia and coronary heart disease.[3]

The relationship between periodontitis and dyslipidemia seems to be a two way relation, that is, it is not clear if periodontal disease affects lipid metabolism or if the condition associated with dyslipidemia damage the dental support tissue. Although it has been suggested that alteration in lipid metabolism and periodontitis may be associated through common physio-pathlogical mechanism, which explains increased risk of cardiovascular disease in patient with periodontitis.[4]

Overweight and obesity have been suggested to be associated with periodontitis, because obesity can have some effects on systemic health by changing the host susceptibility to periodontitis due to inflammatory mediators. The link between periodontal disease and obesity may have important implications for public health because both diseases are important risk factor for cardiovascular disease.[5]

Obesity is well-known to be a significant risk factor for various adult diseases, such as type 2 diabetes, hyperlipemia, hypertension, cholelithiasis, arteriosclerosis, and cardiovascular and cerebro vasc ular disease.[6]

MATERIAL AND METHODS :
The study population consisted of convenience and judgment sample of 200 subjects. All the subjects were included from the Outpatient Department of Periodontics, Shree Bankey Bihari Dental college, Masuri - Ghaziabad. All the patients were categorized by measuring the body mass index.. Subjects underwent a clinical periodontal examination and their weight and height were recorded.

All potential participants were explained the need and design of the study.

COLLECTION OF DATA:
Subjects were screened for their periodontal status. Each subject was examined by a single examiner on a dental chair under proper illumination. The observations were recorded on a printed performa.

ANTHROPOMETRIC DATA COLLECTION :
The definition of obesity is based on the BMI, which is the ratio of body weight to body height squared. So the status of obesity was recorded using the BMI.

Variables like age and sex which could act as covariants for the periodontal disease were recorded.

A complete intraoral examination was done and the oral hygiene was assessed and recorded using plaque index and gingival index and the periodontal status of each patient was evaluated by measuring the periodontal pocket depth and clinical attachment level.

Height (in meters) and weight (in kg) of each patient was recorded and the body mass index (BMI) was calculated.

The most commonly used measure of body fat is the body mass index, which is defined as a person's weight in kilograms, divided by the square of his/her height in meters.[2]

Classifications for body mass indexby WHO
Underweight <18.5
Normal 18.5–24.9
Overweight 25.0–29.9
Obesity class I 30.0–34.9

Obesity class II 35.0–39.9
Obesity class III 40+

INCLUSION CRITERIA

- Dentate persons, 20 - 60 years of age .
- Patients with and without diabetes, hypertension, osteoarthritis will be included in the study.

EXCLUSION CRITERIA

- Patients who had received periodontal treatment or antibiotics for at least 3 months prior to study.
- Chronic usage of anti-inflammatory drugs and premedication within 3 months prior to study.
- Physically and mentally challenged patients.
- Pregnant women and lactating mothers.
- Assesement of the periodontal health will be done by checking the following clinical parameters

1. Plaque index (Silness and Loe)
2. Gingival index (Loe and silness)
3. Probing pocket depth (PPD)
4. Clinical attachment level(CAL)

CRITERIA FOR PERIDONTITIS ACCORDING TO CENTER OF DISEASE CONTROL (CDC)

Clinical Case Definitions Proposed by the CDC Working Group for Use in Population-Based Surveillance of Periodontitis[7]

DISEASE CATEGORY	CAL	PD
Severe periodontitis	>/=2 interproximal sites with CAL ‡6 mm AND (not on same tooth)	>/=1 interproximal site with PD >/= 5mm
Moderate periodontitis	>/=2 interproximal sites with CAL ‡4 mm OR (not on same tooth)	>/=2 interproximal sites with P >/=5mm (not on same tooth)
No or mild periodontitis	Neither "moderate" nor "severe" periodontitis	

RESULTS :

INTERGROUP COMPARISON OF BMI WITH PLAQUE INDEX, GINGIVAL INDEX, PERIODONTAL POCKET DEPTH, CLIN ICAL ATTACHMENT LOSS IN OBESE AND NON OBESE GROUP OF SUBJECTS .

Among the non obese group 99 subjects(95.2%) were having mild or no periodontitis,and 21 subjects (63.6%) were having moderate periodontitis while 35 subjects(55.6%) .Thus it is clear that majority subjects among obese group were having severe periodontitis.

Among the obese group 5 subjects (4.8%) were having mild or no periodontitis and 12 subjects (36.4%) were having moderate periodontitis while 28 subjects (44.4%) were having severe periodontitis, which shows that among obese group majority of subjects were having moderate and severe periodontitis.

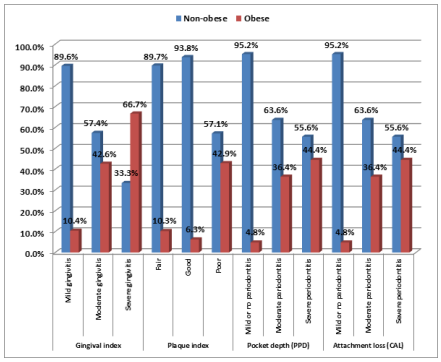
The periodontal pocket depth and clinical attachment loss when compared between obese anon obese group using the chi square test resulted with chi square value 39.704 and P value 0.001* which is statically significant.

Moderate to severe periodontitis as per periodontal Pocket depth (PPD) and clinical Attachment loss (CAL) was significantly more among Obese as compared to non obese subjects.

We can conclude by this study that there is association of prevelance of peridontitis and the oral hygiene status and gingival status of the patient. It was found that periodontitis is more prevelant in patient with poor oral hygiene status.

The distribution of pocket depth and clinical attachment loss was compared between obese and non obese using the chi-square test with Chi-square value 62.587,(p-value < 0.001*). Moderate and severe periodontitis was significantly more among obese group.

Out of 200 patient in the distribution of pocket depth and clinical attachment lose who are non obese were 106 out of which only 30 patient (28.3%)were affected by periodontal disease as compared to 94 obese patient out of which 70 patient(74.4%) were affected by periodontal disease. So according to this study, it is concluded that periodontal disease in significantly related to BMI (basal metabolic index) and more prevelant in obese patient as compared to non obese patient.



Intergroup comparison between obsese and non obese group

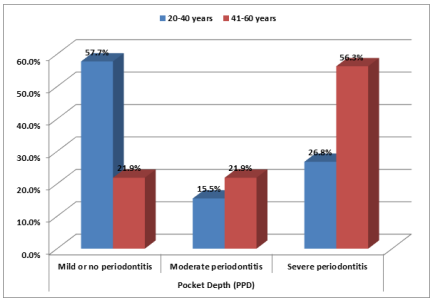
RELATION OF BMI AND AGE DISTRIBUTION AMONG OBESE AND NON OBESE GROUP

Out of total 155 non obese subjects 139 subjects were in the age group of 20 to 40 years and 16 subjects were in the age group of 41 to 60 years.

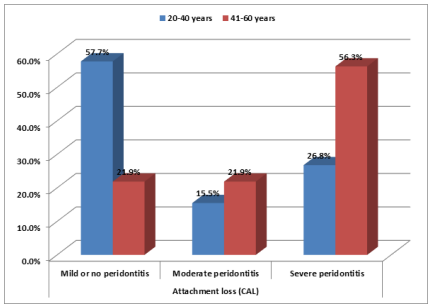
While out of 45 obese subjects 29 subjects were in the age group of 20 to 40 years and 16 subjects were in the age group of 41 to 60 years.

The distribution of BMI categories was compared between 20-40 years and 41-60 years using the chi-square test with Chi-square value = 18.917, p-value = 0.002*, out of 168 patient in age group of 20 to 40 years 139 (82.7%) were in the non obese category and 29 in obese category(17.2%) while among 32 patients in the age group of 41 to 60 years 20 were in non obese(62.5%) and 12 patient were in obese category (37).it shows that obesity has a prevelance in age group of 41 to 60 years .

It is concluded by the data that the distribution of BMI categories was compared between 20-40 years and 41-60 years using the chi-square test. **Non obese category was significantly more among 20-40 years age group**, with chi square value of 18.917 and P value 0.002 which is statically significant.



AGE DISTRIBUTION AND PERIODONTAL POCKET DEPTH



AGE DISTRIBUTION AND CLINICAL ATTACHMENT LOSS (CAL)

RELATION OF BMI AND GENDER DISTRIBUTION AMONG OBESE AND NON OBESE GROUP

Out of 200 subjects 130 subjects were male category and 70 subjects

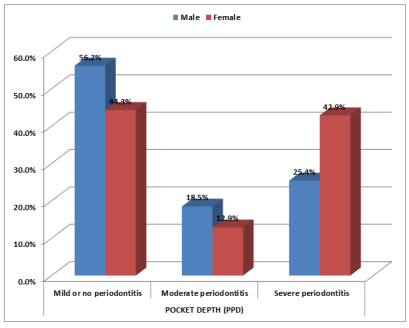
were in female category.

Of the total in 155 non obese category 102 were in male category while 53 were in non obese category.

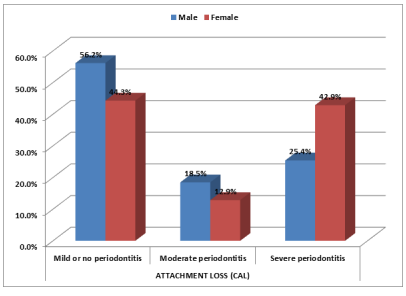
Out of total 45 obese subjects 28 subjects were male and 17 subjects were female subjects.

There is relationship between gender distribution and BMI ,It was found that obesity is more common in female than in male,out of 130 male patients 102(78.5%) were in non obese group while 28(21.5%) were in obese group, on contrary out of 70 female patient 53(75.7%) patient were in non obese group and 17(24%) were in obese category.

It is concluded by the data that the distribution of BMI categories was compared between male and female using the chi-square test. **Non obese category was significantly more among female subjects**, with chi square value of 18.917 and P value 0.002 which is statically significant.



GENDER DISTRIBUTION AND PERIODONTAL POCKET DEPTH



GENDER DISTRIBUTION AND CLINICAL ATTACHMENT LOSS(CAL)

DISCUSSION :

Overweight and obesity as assessed by BMI using WHO criteria were evaluated as risk indicators for periodontal disease(vichea et al). Findings in a recent 3rd National Health and Nutritional Examination Survey in USA(USA NHANES 3) suggested that obesity is significantly associated with periodontitis.

According to current knowledge , the adverse effect of obesity on peridontium might be mediated through impaired glucose tolerance , dyslipidemia or through increased levels of various bioactive substance secreted by adipose tissue.

Obesity is a complex disease, and its relationship with oral status has been realized by the scientific community in the recent years. Various cross-sectional and case-control studies found a strong association between obesity and periodontal disease.. In this study, obesity measured by BMI, was related to periodontal status in terms of periodontal health versus periodontitis along with factor age, gender,. Clinical parameters, including the presence of plaque, gingival inflammation, Periodontal Pocket Depth(PPD) and Clinical Attachment Loss(CAL)were used in the study to relate it with increasing BMI.

The study samples were stratified in two age groups, group 1 (20 to 40) years and group 2 (41 to 60) years of age and the main focus of the study was to evaluate the correlation of BMI with periodontal disease along with role of other confounding factors like age, gender.

By the end of this study it was concluded that the prevelance of periodontal disease higher in obese subjects when compared to non obese subjects. Out of 200 patient in the distribution of pocket depth and clinical attachment lose who are non obese were 106 out of which only 30 patient (28.3%)were affected by periodontal disease as compared to 94 obese patient out of which 70 patient(74.4%) were affected by periodontal disease.

These data are in accordance with the findings of other studies by **Khader YS, Bawadi HA, Haroun TF et al. in (2009)** who researched 340 participants in Jordan to determine the relationship between periodontitis and overweight/obesity among Jordanians. Results indicated that only 14% of normal weight participants had periodontal disease, while nearly 30% of overweight and nearly 52% of obese participants had periodontal disease.[8]

A study by **Shah M, Rehan A, Zakir S et al. in (2015)** support the result of current study , in their study they determined that the rate of developing periodontitis increases 1.8 times more in obese individuals compared to those with a normal BMI.[9]

Possible mechanism may be that with ageing , oral epithelial cells have reduced mitotic activity and metabolic rate. It is assumed that in old age , immune sytem is impaired and make the patient more susptible to bacterial and infection . General deterioration in immune function and tissue integrity in older age may serve as a hypothesis for the weakness in periodontal disease.

This result of relation between the age and periodontal disease was in agreement with the study conducted by **Nanaiah KP, Nagarathna DV ,Manjunath NK in (2013)**, reported that only 1.5% of 1100 subjects (15-18 years old)suffered chronic peridontitis , moreover also stated that the presence of gingivitis started to increase in adolescence(16 years old). This distribution of chronic gingivitis and periodontitis shows there is tendency for periodontal disease to increase in severity in the older age group.[10]

The current study was in support with the study done by **Fahtima Maria Tadjoedin, Amirah Hasna Fitri, Sandra Olivia Kuswandani et al in (2017)**,their results showed that chronic periodontitis occurred frequently in all age groups, with an increasing percentage in the older age groups, such as, 56% in the adolescence group, 74% in the adult group, and 88% in the elderly group[11]

Gender also had an impact on the relationship between obesity and periodontitis. In this study, there were significantly higher proportions of normal BMI subjects in both normal and overweight females compared with male subjects in the same clinical groups. In the present study it was found that out of 200 patient , 70 were female among which 39 female patient were affected by periodontal disease(55 %) as compared to 57 male patient were affected by periodontal disease among total of 130 male patients(43%).It implies that periodontal disease is more prevelant in female gender as compared to male, this result was in support with the study conducted by **Wood N, Johnson RB, Streckfus CF in (2003)** researched the prevalence of periodontitis in 95 obese and 102 non obese participants, aged 25-40 years old in Japan. After controlling for gender, decayed, missing, and filled teeth, results indicated there was a significantly higher prevalence of periodontitis among obese female participants, but not males.[12]

This result was in accoradance with the study conducted by **Thuy Anh Vu Pham, Xuan Ngoc Thi Nguyen in (2015)** , Result of their study was that there was significantly higher prevalence of periodontitis (40.0%) in obese females than nonobese females (13.8%). The means values of periodontal parameters in obese females were significantly higher than those in nonobese females.[13]

The reasons for these sex differences are not clear, but they are thought to be related to the ignorance of oral hygiene, which is usually observed among Females. However, the relationship observed between sex and the disease is not apparent and is not considered as strong and consistent. Thus, sex may be a demographic factor, which may interfere with the effects of other factors and it must be controlled for investigating the disease.

The overall result of the study was in favour of the study which was previously done by **Lalit Kumar Mathur, BalajiManohar, Rajesh Shankarapillai et al in (2011)** conducted study to evaluate the

relationship between obesity and periodontitis . The prevalence of periodontal disease was significantly(P=0.003) higher in patients in obese category (88.0%)compared to patients in nonobese category (74.4%) and among subjects with WC above cut-off, 95.8% were affected by periodontal disease compared to 69.7% of total subjects with WC below cut-off. WC above cut-off was significantly associated with periodontal disease (P=0.000), This study also resulted that the the prevalence of periodontitis was significantly higher in females, in old age and in those with poor oral hygiene.[14]

CONCLUSION:

Obesity is one of the major health concerns in both developed and developing countries.It has been implicated as a significant risk factor systemic for several systemic condition like diabetes, cardiovascular disease, hypertension ,stroke and osteoarthritis.

Because adipose tissue secretes proinflammatory cytokines and tumor necrosis factor(baumann and gauldie 1994), it means that obesity could be a potential cofounder in association between periodontitis and pro inflammatory mediators . Within the scope and limitations of this study , the following observations were made :

- The prevalence of periodontal disease was significantly higher in obese category as compared to patients in non obese category and with with in BMI of the subject the prevelance of periodontitis also increases.
- The prevalence of periodontitis was found to be significantly higher in female patient as compared to male patient.
- Non obese category was significantly more among 20-40 years age group while obese group were more prevelant among 41-60 years of age .and It was concluded in the study that with advancement of age ie in old age the prevelance of periodontitis was more.

These results indicate that obesity increases the risk of periodontitis, and suggest that people exhibiting several components of obesity should be encouraged to undergo a periodontal therapy.

Although the relationship between obesity and periodontitis needs further investigation, periodontist should counsel obese persons regarding the possible oral complication of obesity, to diminish morbidity for those individuals.weight screening should be an integral part of periodontal risk assesement on regular basis.This will reduce the patient's risk of developing periodontitis.

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